# 2008-02-28 Thursday Morning Pbar Notes

Stacking

- Protons on Target
    - Running 7.55e12 at 10 turns.
    - We hope to get back to 11 turns and 8e12 on target if the upstream machines can deliver with acceptable losses.
- Best Stacking Hour
    - Yesterday our Java script incorrectly calculated 41.15mA in one hour. This was traced to the A:IBEAM signal momentarily dropping to zero when we had about 19mA in the stack.   The other readbacks from the Accumulator DCCT did not have this problem.
        - A:BEAM from the Pbeam front end did not have this problem
        - A:IBEAMB or V through an MADC did not have this problem.
        - A:IBEAM through the Keithly DVM from the AP1001 front end had this problem.
        - No other occurances, will keep an eye on this.
        - The corrected number should be 23.35mA at 10:00am.
    - Today the best stacking hour is 22.97mA, still down about 1.5mA/hr from where we want to be.
- Average production was 18.10 e-6/proton
- Target blower was inspected during the Linac downtime
    - Oil was changed and unit was greased.
    - Pressures were less stable after the maintenance, so experts will need to look again at some point.
- DRF1-6 was tripping on the evening shift,   Ops bumped up the voltage on the final amp from 12.2 to 13kV. The station has behaved since.
- Controls Issues update:
    - A:STCKAV (average time between stacking events) stopped updating. This parameter comes back through the MACALC OAC.   Other devices were updating from that OAC, but careful investigation could not find problems elsewhere. The OAC was rebooted, and the problem was fixed.
    - We had lost digital alarm capabilities on a debuncher momentum amp after a reboot of the PBCool front end. Controls experts added a patch to the code, and after a reboot, the problem was fixed.

and after a reboot, the problem was fixed.
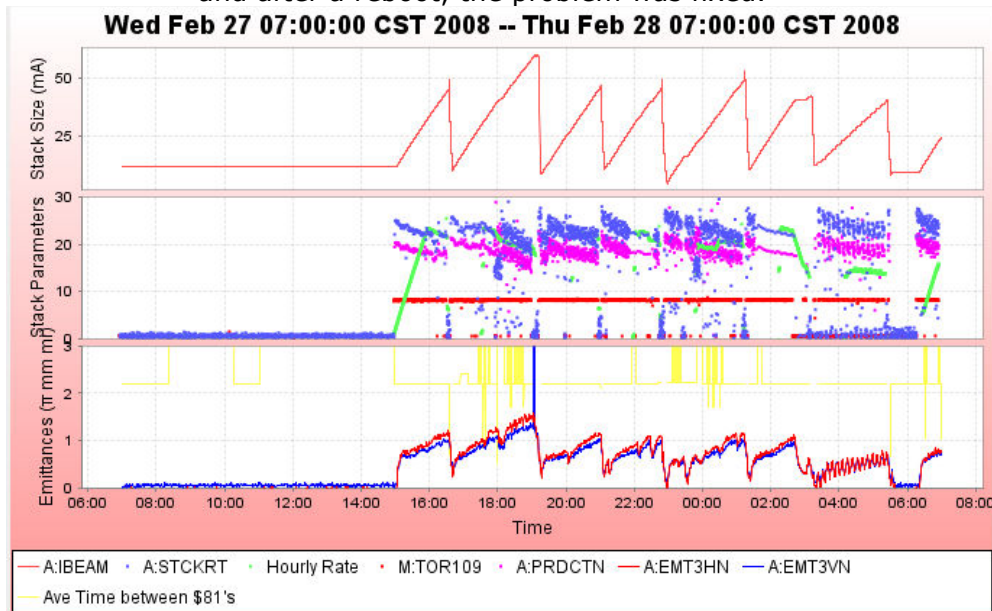
Transfers

- Unstacked 262mA in 21 transfers over 7 sets.
    - Average Acc to MI efficiency was 96.9%
    - Average Acc to RR efficiency was 91.3%
- At first glance, it looks like efficiencies are back up to normal, but a closer look reveals.
    - The last two owl shift transfers were more efficient, bringing up the average. Linac beam interruptions, allowed for extra cooling on these transfers, resulting in smaller emittances and better transfer efficiency.
    - If we take those two transfers out of the picture, the overall efficiency is down a percent or so after the ARF4 bucket size increase from two days ago. We would like to take that change out.

Column 1 Number _0_Pbar	Column 4 Number_3_Transfer Time		Column 21 Number_2 20_A:IBEAM B sampled	Column 22 Number _21_A:IB	Unstacked (mA)	Column 23 Number _22_R:BE	Column 24 Number _23_R:BE	Stashed	Acc to RR Eff	Column 27 Number_ 26_MI	Column 28 Number_2 7_MI Before	Acc to MI Eff	Acc to MI2 Eff	Transfers	Sets
	2/28/2008	7:00:00 AM			262.397			239.50	91.27%	254.166	253.046	96.86%	96.44%	21	7
7291	Thursday, February 28, 2008	5:25:19 AM	40.588	8.588	32.000	66.609	96.683	30.07	93.98%	31.239	31.148	97.62%	97.34%	3	1
7290	Thursday, February 28, 2008	3:12:22 AM	42.387	12.788	29.599	38.681	66.723	28.04	94.74%	28.934	29.110	97.75%	98.35%	2	1
7289	Thursday, February 28, 2008	1:15:40 AM	49.387	10.588	38.799	3.470	38.800	35.33	91.06%	37.518	37.050	96.70%	95.49%	3	1
7288	Wednesday, February 27, 2008	10:49:06 PM	45.588	4.988	40.600	85.090	122.773	37.68	92.82%	39.740	39.649	97.88%	97.66%	4	1
7287	Wednesday, February 27, 2008	9:01:32 PM	46.188	10.588	35.600	53.518	85.436	31.92	89.66%	34.239	34.159	96.18%	95.95%	3	1
7286	Wednesday, February 27, 2008	7:11:10 PM	59.387	8.588	50.799	9.302	54.249	44.95	88.48%	48.828	48.144	96.12%	94.77%	3	1
7285	Wednesday, February 27, 2008	4:35:15 PM	45.388	10.388	35.000	287.469	318.972	31.50	90.01%	33.668	33.786	96.19%	96.53%	3	1

Studies

- Much analysis from our Debuncher cooling studies are complete. I will provide more details in my Friday presentation.

Requests and Plan for the Day

- Continue to tune up on stacking.
- Stacking tests
    - Stack at a slower cycle time and/or lower intensity beam to optimize production.
    - This will help us sort out what systems are responsible for our slight decrease in stack rates this week.

in stack rates this week.
- This study will only take about 10-15 minutes.
○ Parasitic Studies
  ▪ Measure the impact on the final Debuncher momentum spread by delaying the start of bands 3 and 4 by various amounts. This is a parasitic study.
○ Owl shift stacking cycle with 10% increased lens gradient.
  ▪ We currently run at 750T/m, and would go to 825T/m. The supply as been tested at 850T/m, so the risk is expected to be minimal.
  ▪ Expert will come in on mid owl shift prior to a stacking cycle to tune-up. Impact should be minimal for the tuneup and maybe even better stacking during the test.
○ Need one hour without stacking to look at the target blower. This is not urgent, and should be lined up with other downtime.
○ Access heads up:
  ▪ We currently don't have enough to request an access on our own, but if Booster vacuum or other issues give us extended downtime, we would go into the pbar rings.
  ▪ If we had one or two hours, we would go in and fix
    □ DRF1-3
    □ Un-stick the Accumulator vertical damper pickup (remember we may have difficulties going to large stack sizes until this is fixed).
    □ A broken trombone.
  ▪ If we had four hours we would install the Debuncher optical notch filters.
○ Heads up:
  ▪ By early next week a new Debuncher band 1 equalizer will be ready. When installed, we would have to characterize the cooling both before and after this work is done. That is one hour on each end of the work with a long cycle time.

Other
  ○ Paul's Numbers
    ▪ Today
      □ Most in an hour: 22.97 mA at Thu Feb 28 02:23:54 CST 2008
      □ Best: 25.19 mA on 30-Jan-08
      □ Average Production 18.10 e-6/proton Best: 25.41 e-6/proton on 01/30/2008
      □ Average Protons on Target 6.85 e12 Best: 8.77 e12 on 07/24/2007
      □ Largest Stack 59.46 mA Best: 313.58 mA on 02/18/2008
    ▪ Yesterday
      □ Most in an hour: 41.15 mA at Tue Feb 26 23:48:31 CST 2008
      □ Best: 41.15 mA on 27-Feb-08
      □ Average Production 18.25 e-6/proton Best: 25.41 e-6/proton on 01/30/2008
      □ Average Protons on Target 6.73 e12 Best: 8.77 e12 on 07/24/2007
      □ Largest Stack .00 mA Best: 313.58 mA on 02/18/2008
    ▪
  ○ Al's Numbers
    ▪ Stacking
      □ Pbars stacked: 273.72 E10
      □ Time stacking: 15.02 Hr
      □ Average stacking rate: 18.23 E10/Hr

    ▪ Uptime
      □ Number of pulses while in stacking mode: 24020
      □ Number of pulses with beam: 19778
      □ Fraction of up pulses was: 82.34%

    ▪ The uptime's effect on the stacking numbers
      □ Corrected time stacking: 12.37 Hr

- □ Possible average stacking rate: 22.14 E10/Hr
- □ Could have stacked: 332.43 E10/Hr

- ▪ Recycler Transfers
    - □ Pbars sent to the Recycler: 260.97 E10
    - □ Number of transfers : 21
    - □ Number of transfer sets: 7
    - □ Average Number of transfer per set: 3.00
    - □ Time taken to shoot: 00.96 Hr
    - □ Time per set of transfers: 08.19 min
    - □ Transfer efficiency: 92.17%

- ▪ Other Info
    - □ Average POT : 7.56 E12
    - □ Average production: 18.30 pbars/E6 protons